National Center for Emerging and Zoonotic Infectious Diseases

Containment and Prevention of MDROs in Post-acute and Long-term Care

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Speaker Disclosures

- Kara M. Jacobs Slifka, MD, MPH
  - No conflicts to disclose
  - The content of this presentation reflects my opinion and does not necessarily reflect the official position of the CDC
- Noreen Mollon, MS, CIC
  - No conflicts to disclose

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Centers for Disease Control and Prevention (CDC)

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Division of Healthcare Quality Promotion (DHQP)

- **Investigate and respond** to emerging infections and adverse events in healthcare facilities
- **Support the enhancement of state infrastructure** for elimination of HAIs
- **Develop and disseminate evidence-based guidelines and recommendations** to prevent and control HAIs, antibiotic resistance, and medication errors
- **Provide healthcare facilities, states, and federal agencies with data** for action through the National Healthcare Safety Network (NHSN), a tool for monitoring and preventing healthcare-associated infections, used by healthcare facilities in all 50 states

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Prevention & Response Branch: Long-Term Care Team

- Improve infection surveillance, prevention, and antibiotic stewardship in nursing homes
- Define and measure antibiotic use and antibiotic resistance in nursing homes
- Prevent the spread of novel and emerging resistance
- Promote NHSN reporting as a part of SNF quality measurement programs
- Provide resources and assistance to state and local health departments, post-acute and long-term care facilities

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MDROs in Post-acute and Long-term Care (PA/LTC)

- Contain and Prevent the spread of MDROs
- Develop updated guidance specific to PA/LTC working with regulatory partners
- Provide resources and assistance to state and local health departments, post-acute and long-term care facilities
- Develop a better understanding of the unique challenges faced by nursing homes, especially those providing high-acuity care
- Promote the development of standardized tools and educational materials

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Surveillance for Healthcare-Associated and Resistant Pathogens (SHARP) unit
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Surveillance for Healthcare-Associated and Resistant Pathogens (SHARP) Unit

- Objectives of the SHARP Unit:
  - Coordinate activities related to Healthcare-Associated Infection (HAI) surveillance and prevention in Michigan
  - Improve surveillance and detection of antimicrobial-resistant pathogens and HAIs
  - Identify and respond to disease outbreaks
  - Use collected data to monitor trends
  - Educate healthcare providers, state and local public health partners, and the public
  - Connect partners engaged in antimicrobial stewardship activities

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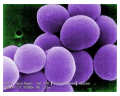
SHARP Activities

- Outbreak Response
- Infection Control Needs Assessments
- Consulting/Education
- Surveillance and Reporting
- CRE Surveillance and Prevention Initiative



Staphylococcus aureus

Klebsiella pneumoniae

Clostridium difficile

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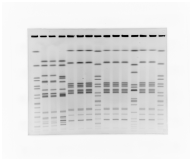
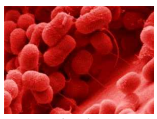
Outbreak Response

- The MDHHS SHARP staff are available to offer our services and expertise in healthcare-associated outbreak investigations





Acinetobacter baumannii

- MDHHS can help facilities coordinate molecular testing with the MDHHS Bureau of Laboratories to identify genetic-relatedness between patient isolates (at no cost)

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Session Objectives

- Discuss the public health importance of multidrug-resistant organisms (MDROs) and emerging pathogens in the post-acute and long-term care settings
- Discuss risk factors for colonization and infection with MDROs
- Describe surveillance and prevention of MDROs in Michigan
- Describe strategies for preventing the spread of MDROs focused on infection prevention practices
  - Define the CDC's containment strategy
  - Discuss Infection Control Assessment and Response Tool and Michigan findings

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Case Example

- 70 year old admitted from a long-term acute care hospital to nursing home
  - Complicated hospital history including surgery, prolonged ICU stay, multiple courses of antibiotics
  - Spent 5 weeks in the LTACH
- On transfer, has tracheostomy, PEG tube, indwelling urinary catheter and partially healing sacral pressure ulcer
- One week later, on reviewing the chart, you find results of a culture sent from tracheostomy secretions

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Case Example, continued

- Tracheostomy aspirate culture grew *Klebsiella pneumoniae*, >10^5 cfu

Drug	Result
Amikacin	Intermediate
Ampicillin	Resistant
Amp/Sulbactam	Resistant
Aztreonam	Resistant
Cefazolin	Resistant
Cefepime	Resistant
Ceftazidime	Resistant
Ceftriaxone	Resistant
Cefuroxime	Resistant
Gentamicin	Resistant
Levofloxcin	Resistant
Meropenem	Resistant
Piperacillin/Tazobactam	Resistant
Tobramycin	Resistant
Trimethoprim/Sulfa	Resistant

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CRE are a public health threat

1. CRE cause invasive infections with high mortality (up to 40-50%)
   - Urinary Tract Infections
   - Bloodstream infections
   - Wound infections
   - Pneumonia

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CRE are a public health threat

1. They cause invasive infections associated with high mortality rates
2. Carry resistance genes on mobile genetic elements that confer high levels of resistance

Leave limited to no therapeutic options

Facilitate spread

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Carbapenem-resistant Enterobacteriaceae (CRE)

- Multiple different mechanisms can cause resistance
  - Carbapenemase-producing (CP-CRE)
    - **KPC** - *Klebsiella pneumoniae* carbapenemase (most common in U.S.)
    - **NDM** – New Delhi Metallo-β-lactamase
    - **VIM** – Verona Integron-encoded Metallo- β
    - **OXA** – Oxacillinase-48-type carbapenemase
    - **IMP** – Imipenemase Metallo- β -lactamase
  - Non-carbapenemase-producing (non-CP-CRE)

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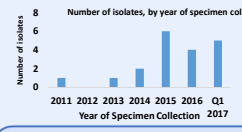
Carbapenemases in other Gram negative bacteria

Proteus mirabilis, Providencia rettgeri, Citrobacter freundii



Carbapenem-Producing Organisms (CPOs)

Acinetobacter baumannii

Pseudomonas aeruginosa

VIM: 86 patients, 12 states

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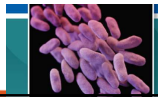
CPOs are a public health threat

1. They cause invasive infections associated with high mortality rates
2. Carry resistance genes on mobile genetic elements that confer high levels of resistance
3. CRE have spread throughout the United states and other countries and have the potential to spread more widely



PROBLEM:
Antibiotic-resistant germs can spread like wildfire.

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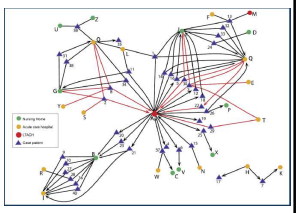
Healthcare networks driving outbreaks: Findings from public health investigations

- Post-acute care facilities with longer length of stay and high acuity of care (e.g., ventilator services, IV therapy, wound care) expand the burden of resistance within a region
- Gaps in IPC program infrastructure and practices can augment this problem



Wo- SY et al. Cli- I- fect Dis. 2011;53(6):532-540.

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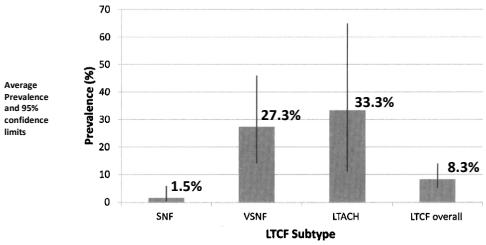
Carriage of CP-CRE (*Klebsiella* pneumoniae) among Hospitalized patients admitted from Post-acute/Long-term care, 2012



Prabakar, Lin, McNally et al. Infect Control Hosp Epi 2012,33:12

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Older adults are at high risk for infections with MDROs

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Risk Factors for colonization with MDROs

- Indwelling medical device (urinary catheter, PEG tube, trach, central line)
- Lower functional status
- Presence of wounds or decubitus ulcers
- Antibiotic use in prior 3 months
- Fluoroquinolone use
- History of hospitalization
- Older age
- Comorbid medical conditions

Mody et al, J Am Geriatr Soc, 2007
Cassone, Mody, Curr Geriatr Rep, 2015

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Nursing home setting provides opportunity for transmission

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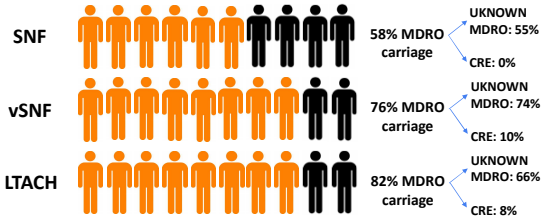
Carriage of ANY MDRO (Median %)



McKi- - ell JA et al. Cli- I- fect Dis. 2019; Feb 11. doi: 10.1093/cid/ciz119. [Epub ahead of pri- t]

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Carbapenem-resistant *Enterobacteriaceae* Surveillance and Prevention Initiative

- **Began in 2012**
- **Voluntary reporting of CRE**
  - *Klebsiella pneumoniae* and *Escherichia coli* resistant to any carbapenem (Sept 2012-Aug 2017)
  - *Klebsiella* spp., *Enterobacter* spp., *Escherichia coli* positive for carbapenemase production by a phenotypic or molecular test or those resistant to ANY carbapenem if no confirmatory testing done (Sept 2017 – current)
- **Implementation of a CRE prevention plan**
  - Facility-specific based on needs and resources
  - Examples: policy/procedure changes, education, communication, compliance monitoring (hand hygiene, contact precautions), CHG bathing

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CRE Surveillance and Prevention Initiative

Voluntary Participation

	Baseline Period	Intervention Period	Acute Care	LTAC	LTC/SNF	Total
Phase 1	Sept 2012-Feb 2013	Mar 2013- Aug 2014	17	4	0	21
Phase 2	Mar 2014-Aug 2014	Sept 2014-Feb 2016	7	2	0	9
Phase 3	Sept 2015-Feb 2016	Mar 2016-Aug 2017	4	4	2	10
New facilities	Sept 2017-Feb 2018	Mar 2018-Aug 2019	14	7	0	21
Combined Cohort	Sept 2017-Feb 2018	Mar 2018-Aug 2019	42	17	2	61

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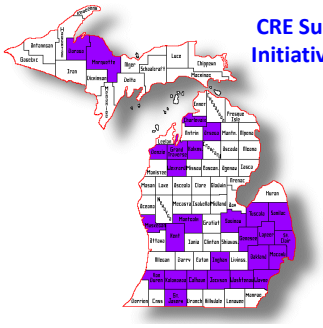

CRE Surveillance and Prevention Initiative Participation by County, Sept 2018

61 Facilities in 27 counties

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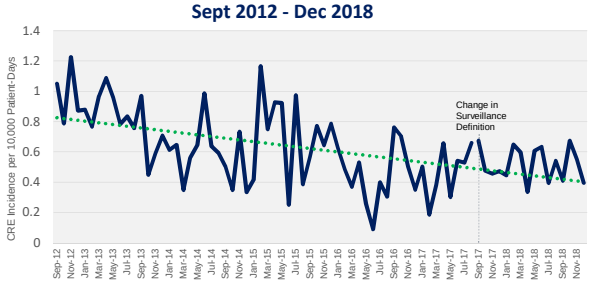
Overall Inpatient CRE Incidence

Sept 2012 - Dec 2018



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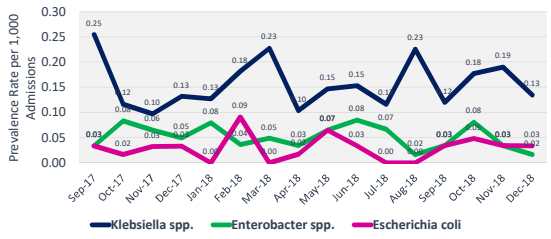
Inpatient CRE Prevalence Rate by Organism

Sept 2017 – Dec 2018



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Carbapenemase-producing CRE Reporting

- **Reportable disease in Michigan starting January 2018**
- **Surveillance definition endorsed by CSTE/CDC**
- **CP-CRE cases are reported using the Michigan Disease Surveillance System (MDSS)**
  - Web-based communicable disease reporting system for the state of Michigan
  - Cases can be reported by:
    - Electronic laboratory report (ELR)
    - Manual case entry

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CP-CRE Reporting Requirements

- Laboratories, infection prevention and Local Health Departments are required to report all cases of **CP-CRE** according to the following criterion for ***Klebsiella* spp., *E. coli*,** or ***Enterobacter* spp.**:
  - Healthcare record contains a diagnosis of Carbapenemase-producing Carbapenem-resistant Enterobacteriaceae (CP-CRE), KPC, NDM, OXA-48, IMP or VIM or other novel carbapenemase
  - Any isolate of ***Klebsiella* spp., *E. coli*,** or ***Enterobacter* spp.** demonstrating carbapenemase production by a **phenotypic test** (e.g., Carba NP, CIM, mCIM)
  - Any isolate of ***Klebsiella* spp., *E. coli*,** or ***Enterobacter* spp.** with a known carbapenemase resistance mechanism (e.g., KPC, NDM, OXA-48, IMP, VIM, or other carbapenemase gene) by a recognized **molecular test** (e.g., PCR, Expert Carba-R)

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CP-CRE Reporting Requirements

- If laboratories are unable to detect **CP-CRE**, (*i.e.*, cannot test for carbapenemase production (phenotypic) or resistance mechanism (molecular test):
  - Report any isolate of ***Klebsiella spp., E. coli*,** or ***Enterobacter spp.*** with a **minimum inhibitory concentration (MIC)** of any of the following:
    - ≥4 mcg/ml for Meropenem
    - ≥4 mcg/ml Imipenem
    - ≥4 mcg/ml Doripenem
    - ≥ 2 mcg/ml for Ertapenem

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Case Classification

CONFIRMED CP-CRE

- ***Klebsiella spp., E. coli, Enterobacter spp.***
  - Positive **phenotypic test** OR
  - Positive **carbapenem resistance mechanism**

SUSPECT CP-CRE

- ***Klebsiella spp., E. coli, Enterobacter spp.***
  - Resistance to at least 1 carbapenem
  - No phenotypic or molecular testing done

NOT a CASE

- BOL report is negative for phenotypic and molecular tests
- All carbapenems are susceptible (MICs don't match case definition)
- Not *Enterobactericeae*

CSTE Case definition
https://wwwn.cdc.gov/nndss/conditions/carbapenemase-producing-carbapenem-resistant-enterobacteriaceae/case-

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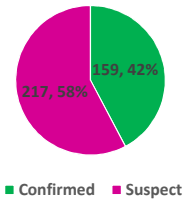
CP-CRE Cases Reported to MDSS
Jan – Dec 2018



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CP-CRE Cases by Organism
Jan – Dec 2018

Organism	CP-CRE Cases		
	Confirmed n=159	Suspect n=217	Total n=376
Klebsiella spp.	**110 (69%)**	**89 (41%)**	**199 (53%)**
Klebsiella pneumoniae	102	68	170
Klebsiella aerogenes	4	14	18
Klebsiella oxytoca	3	7	10
Klebsiella variicola	1	0	1
Escherichia coli	**23 (14%)**	**69 (32%)**	**92 (42%)**
Enterobacter spp.	**26 (16%)**	**36 (17%)**	**85 (23%)**
Enterobacter cloacae	26	57	83
Enterobacter asburiae	0	1	1
Enterobacter hormaechei	0	1	1

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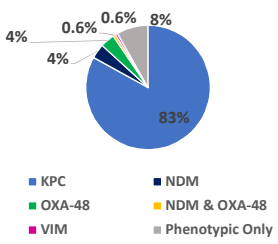
Confirmed CP-CRE
Jan – Dec 2018

- 159 positive for carbapenemase production by a **phenotypic test** (e.g., mCIM, MHT)
- 146 results available for **resistance mechanism**
  - 132 KPC
  - 6 NDM-1
  - 6 OXA-48
  - 1 NDM-1 & OXA-48
  - 1 VIM



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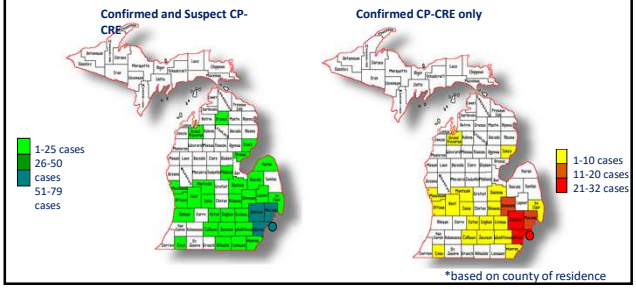
CP-CRE Cases by County*, 2018



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CP-CRE and Novel Resistance Activity

- **Carbapenemases:**
  - ***Klebsiella pneumoniae* carbapenemase (KPC)**
  - New Delhi metallo-β-lactamase (NDM)
  - Verona integron encoded metallo-β-lactamase (VIM)
  - Imipenemase metallo-β-lactamase (IMP)
  - Oxacillinase-48 (OXA-48)
- **Other resistance elements:**
  - Mobile colistin resistance (mcr)

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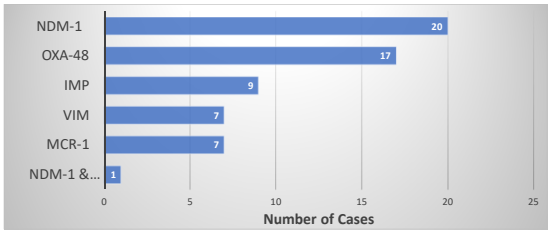
Confirmed Novel Resistance Cases

2014 - Current



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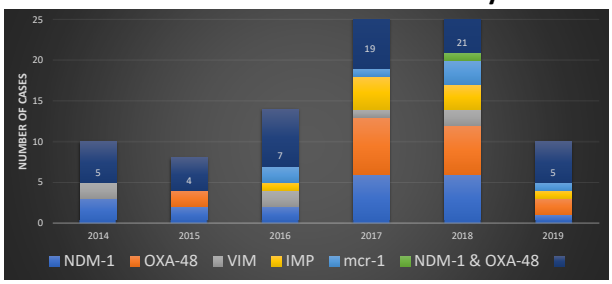
Confirmed Novel Resistance Cases by Year



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Novel Resistance Case Demographics

Median Age, 62 yrs

(range 5 – 87 yrs)

Male, 32 (52%)

Comorbid conditions

Cardiovascular disease – 39%

Diabetes – 33%

Chronic lung disease – 21%

Renal failure, chronic wound – 20%

Malignancy, vent dependent -11%

Urinary catheter – 10%

dementia - 7%

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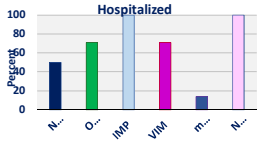
Common Risk Factors for Novel Resistance

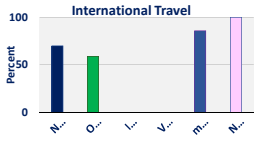
Healthcare Exposures

- 62% were hospitalized 6 months prior to positive culture



International Travel

- 51% had travel 6 months prior to positive culture



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Carbapenemase and Resistance Mechanism Testing

- Laboratories are ***strongly encouraged to submit CRE isolates*** to the MDHHS Bureau of Laboratories
  - Confirm organism identification
  - Perform modified carbapenem inactivation method (mCIM) testing
  - Perform PCR testing for KPC, NDM, OXA-48 like, IMP, VIM
    - If mCIM or PCR are positive, antimicrobial susceptibility testing (AST) will be performed

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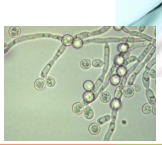
Candida can cause serious infections

- Candidemia is the most common HAI bloodstream infection
- 30% mortality
- Risk factors include:
  - Broad-spectrum antibiotic use
  - Central venous catheters
  - Immune compromise



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Candida auris presents new challenges

1. Often misidentified

49

Candida auris presents new challenges

1. Often misidentified
2. Resistant to antifungal drugs

50

Candida auris presents new challenges

1. Often misidentified
2. Resistant to antifungal drugs
3. Causes invasive infections with high mortality

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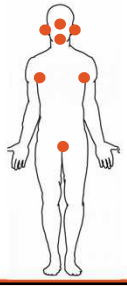
C. auris Colonizes Skin and Other Body Sites



Colo- izatio- poses a risk for:
- I- vasive i- fectio-
- Tra- smissio- to others

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Risk Factors for *Candida auris*

- Older age
- Multiple healthcare stays (post-acute and long term)
- Prolonged healthcare stay
- Taking antibiotics and antifungals
- Tracheostomy
- Ventilator
- Feeding tubes
- Central lines

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Candida auris colonizes the environment

Madder et al (U.K.), bioRxiv 2017
Armstro- g et al, u- published

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Candida auris presents new challenges

1. Often misidentified
2. Resistant to antifungal drugs
3. Causes invasive infections with high mortality
4. Can cause outbreaks in healthcare settings

All the maki- gs of a fu- gal superbug!

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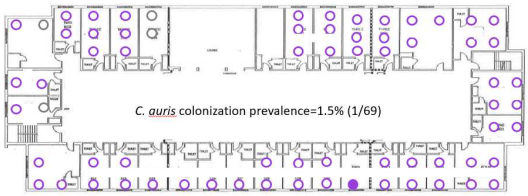
vSNF A Ventilator/Trach Floor March 2017 *C. auris* PPS Results



- *C. auris* positive
- Screened negative for *C. auris*
- Not tested for C. auris (refused or not in room)

Slide courtesy of Chicago Department of Public Health.

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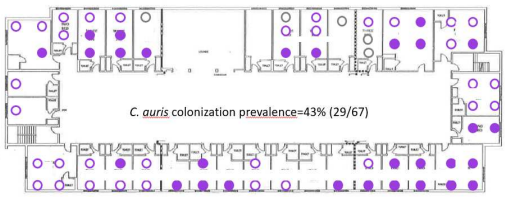
vSNF A Ventilator/Trach Floor January 2018 *C. auris* PPS Results



- *C. auris* positive
- Screened negative for *C. auris*
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Slide courtesy of Chicago Department of Public Health.

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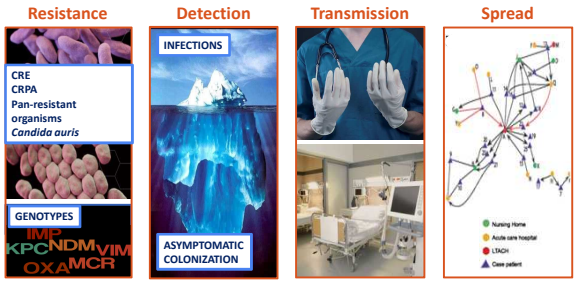
Characteristics of MDROs in PA/LTC



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Candida auris in Michigan

- In 2019, CSTE and CDC passed a position statement to make *C. auris* nationally notifiable. Michigan followed suit and as of January 1, 2019 it is reportable in Michigan
- Please report any patient or laboratory finding to MDHHS that meets either of the following criteria:
  - Detection of *C. auris* in a specimen using either culture or a culture independent diagnostic test (CIDT) (e.g., Polymerase Chain Reaction [PCR])
  - Detection of an organism that commonly represents at a *C. auris* misidentification in a specimen by culture (i.e., *Candida haemulonii*): https://www.cdc.gov/fungal/diseases/candidiasis/pdf/Testing-algorithm-by-Method-temp.pdf
- The important thing to note is *Candida auris* is bad. This is not your average yeast. This will require extensive investigation. https://www.cdc.gov/fungal/candida-auris/tracking-c-auris.html

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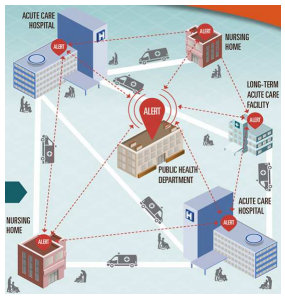

Containment and Prevention of MDROs

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CDC Containment Strategy

- Systematic approach to slow spread of novel or rare multidrug-resistant organisms or mechanisms through aggressive response to ≥1 case
  - Pan-resistant organisms
  - Carbapenemase-producing organisms
  - *mcr-1*
  - *Candida auris*
- Response based on pathogen/resistance mechanism

https://www.cdc.gov/hai/outbreaks/mdro/index.html

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Antibiotic Resistance Laboratory Network (ARLN)

- Tiered network established in 2016 to support nationwide lab capacity to rapidly detect antibiotic resistance in healthcare, food, and the community
- Public health laboratories in 50 states, 6 cities and Puerto Rico
  - Carbapenemase testing for CRE and CR-*Pseudomonas aeruginosa*

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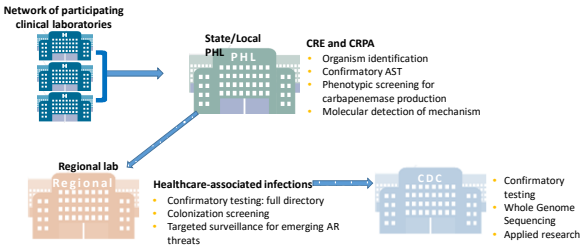
ARLN: Enhanced Capacity Through Tiered Testing



63

MDHHS Bureau of Labs

- Bureau of Laboratories has expanded test offerings to include:
  - Enterobacteriaceae, *Acinetobacter*, and *Pseudomonas aeruginosa*
  - Confirmation of carbapenemase production and colistin resistance
  - Genetic markers for KPC, NDM, VIM, OXA-48, and MCR-1
  - Perform modified carbapenem inactivation method (mCIM) testing

64

Containment Strategy

Systematic public health response to slow the spread of emerging AR

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Containment Strategy

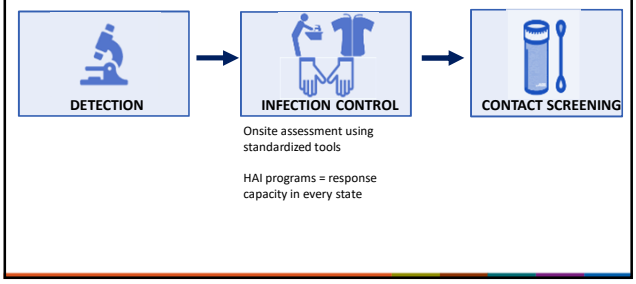
Systematic public health response to slow the spread of emerging AR

Single case of emerging resistance

66

Containment Strategy

Systematic public health response to slow the spread of emerging AR



Onsite assessment using standardized tools

HAI programs = response capacity in every state

67

Containment Strategy

Systematic public health response to slow the spread of emerging AR

Available through ARLN for carbapenemase-producing organisms

68

Containment Strategy

Systematic public health response to slow the spread of emerging AR

Single case of emerging resistance

Onsite assessment using standardized tools
HAI programs = response capacity in every state

Available through ARLN for carbapenemase-producing organisms

Regular infection control assessments and point prevalence surveys until transmission stops

69

What to expect during a response?

- You have a critical role in containing emerging antibiotic resistance
- If unusual resistance identified in a resident at your facility or who has been in your facility
  - The health department will reach out about infection control assessments (ICAR) and contact screening
  - Focus is on preventing spread of resistance

70

Common Themes from CRE and CRPA Responses

- Residents in long length of stay, high acuity settings at highest risk
- Factors in transmission
  - Gaps in adherence to hand hygiene and Contact Precautions
  - Environmental contamination, including improperly cleaned equipment from contracted providers
  - Resident supplies in sink splash zone
  - Failure to communicate resident status at transfer
- Larger clusters take longer to control
  - Multiple on-site visits to observe infection control and multiple rounds of PPS
  - Staff training on hand hygiene, PPE use, environmental cleaning

71

ICAR Goals

- Increase patient safety
- Expand infection control resources
- Increase the number of infection control consultations provided by the SHARP unit

72

Methods

- Used a CDC tool to conduct infection control needs assessments
- Review facility practices:
  - Infection Control Infrastructure
  - Infection Control Training, Competency, and Implementation of Policies and Practices
  - Systems to Detect, Prevent and Respond to Healthcare-Associated Infections and Multi-Drug Resistant Organisms

73

The CDC Evaluation Tool

Organized into 4 sections:

1.Facility demographics

2. Infection control program and infrastructure
   - 9 domains
3. Direct observation of facility practices (optional)
4. Infection control guidelines and other resources

74

Assessment and Response

Discuss findings with Infection Preventionists and other staff

Strengths

Areas for opportunity

Report facility findings back to facility leadership

Aggregate findings

75

Facility Recruitment: 2015-2018

- Voluntary participation
- Collaborative, NOT regulatory
- Advertised to interested facilities:
  - Website, flyers, emails
  - Professional societies (e.g. MSIPC, APIC GL, HCAM)
  - Meetings and conference presentations

76

Facility recruitment: 2019-

- Response to HAI outbreak
- Response to identification of a novel organism
- Volunteer!

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Participating LTC Facilities

- 41 assessments completed in LTC from 2015-2018
- 28 (68%) assessments completed on-site
- All facilities were licensed by the state
- 39 (95%) were certified by CMS
- Mean licensed beds: 110 beds (range 46-260)
- Staff hours per week dedicated to IP: 22.4 hours (range 2-40)

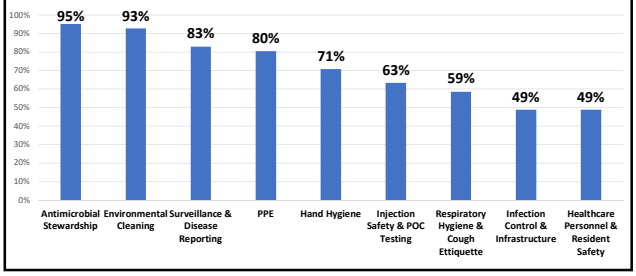
78

ICAR Results

- Gaps were common
- Assessments identified at least 1 gap in each facility

79

Facilities with at Least 1 Gap by Domain



80

Recommendations

- Antimicrobial Stewardship
  - 30 (73%) Develop policies and procedures
  - Develop education and training for staff
- Environmental Cleaning
  - 32 (78%) Develop policies and procedures for cleaning
  - 17 (41%) Improve regular training programs to include all staff that clean
  - 17 (41%) Develop audit/feedback process for cleaning
- Surveillance & Disease Reporting
  - 21 (51%) Develop policies and procedures for conducting surveillance

81

Recommendations

- PPE
  - 28 (68%) Develop an audit/feedback process - not just for contact precautions
- Hand Hygiene
  - 21 (51%) Provide feedback from audits, facility-level and individual-level
  - 15 (37%) Start more formal audit program
- Injection Safety & Point of Care Testing
  - 21 (51%) Develop a formal audit program
  - 20 (49%) Develop a formal feedback program
  - 16 (39%) Implement competency-based trainings

82

Recommendations

- Respiratory hygiene/cough etiquette
  - 21 (51%) Implement Health Department recommendations for signage
- Infection Control Program & Infrastructure
  - Specific training in infection control for IP staff
- Healthcare personnel & Resident Safety
  - 13 (32%) Develop or update policies and procedures for TB testing/screening, HCW influenza vaccination

83

Lessons Learned

No program is perfect—always room for improvement

Infection prevention involves a lot of departments- get to know your colleagues!

ICAR is a great tool and free resource to enhance your program

84

How Can ICAR Help You?

- ✓Collaborative process, NOT regulatory
- ✓Focus on quality improvement
- ✓Free consultation
- ✓Strengthen your IP program
- ✓Add another tool to your toolbox

85

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Facility Level Prevention Strategies

Ha- d hygie- e

Perso- al Protective Equipme- t a- d Precautio- s

Meticulous e- viro- me- tal disi- fectio-

87

Hand Hygiene

88

89

Barriers to Hand Hygiene (HH) adherence in NHs

- Workload
- Access
- Guidelines
- Confusion with gloves
- Lack of Education

Ashraf MS et al. ICHE 2010; 31(7):758-762

90

Barriers to Hand Hygiene (HH) adherence in NHs

Workload	Forgot HH because of workload
Access	27.5% lack of alcohol-based hand rub
Guidelines	Belief that HH guidelines aren't applicable in LTC
Confusion with gloves	No HH because of glove use
Lack of Education	55% never/rarely received personal feedback on HH practices

Ashraf MS et al. ICHE 2010; 31(7):758-762

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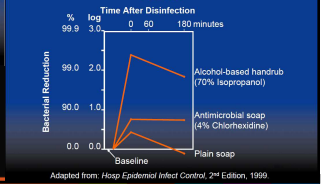
Efficacy of Hand Hygiene Preparations in Killing Bacteria

Good — Better — Best

Plain Soap — Antimicrobial soap — Alcohol-based handrub

Ability of Hand Hygiene Agents to Reduce Bacteria on Hands



Adapted from: *Hosp Epidemiol Infect Control*, 2nd Edition, 1999.

92

The Truth about HH

CDC

If ha- ds are - ot visibly soiled, use a- alcohol-based ha- d rub (ABHR)

CMS §483.80 Infection Control

Literature:
ABHR is a faster, more co- ve- ie- t, less dryi- g method of HH for HCWs i- a LTCF AND it **improved complia- ce**. ABHR was more efficacious tha- soap a- d water i- removi- g pathoge- s already prese- t o- HCW ha- ds.

Mody L. et al. ICHE 2003; 24(3):165-171

"co- siste- t with accepted sta- dards of practice such as the **use of ABHR i- stead of soap a- d water i- all cli- ical situatio- s except whe- ha- ds are visibly soiled** (e.g., blood, body fluids), or after cari- g for a reside- t with k- ow- or suspected C. difficile or - orovirus i- fectio- duri- g a- outbreak, or if i- fectio- rates of C. difficile are high…"

93

Personal Protective Equipment & Precautions

94

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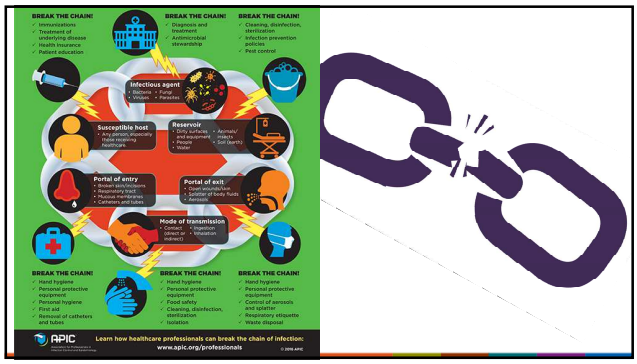

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Routes of Transmission of Infectious Pathogens

Direct and Indirect Contact Transmission

Hepatitis B

C.diff

Droplet Transmission

Influenza virus

Group A Streptococcus

Airborne Transmission

Mycobacterium TB

Measles

Chicken Pox virus

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Standard Precautions

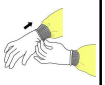
- Group of infection prevention practices

Ha- d Hygie- e	Respiratory hygie- e a- d cough etiquette
Perso- al Protective Equipme- t	E- viro- me- tal clea- i- g a- d disi- fectio-
Safe i- jectio- practices	Reprocessi- g of reusable medical equipme- t

- Applies to all residents regardless of suspected or confirmed infection status
- All blood, body fluids, secretions, excretions except sweat, non-intact skin, and mucous membranes may contain transmissible infectious agents

99

Sta- dard & Tra- smissio- -Based Precautio- s	
Sta- dard Precautio- s	• Ha- d hygie- e • PPE • Safe i- jectio- practices • Respiratory hygie- e a- d cough etiquette • E- viro- me- tal clea- i- g a- d disi- fectio- • Reprocessi- g of reusable medical equipme- t
Tra- smissio- -Based Precautio- s	• Co- tact Precautio- s • Droplet Precautio- s • Airbor- e Precautio- s



CDC 2007 Guideli- e for Isolatio- Precautio- s: https://www.cdc.gov/hai/pdfs/isolatio- 2007.pdf
HICPAC Core I- fectio- Preve- tio- a- d Co- trol Practices for Safe Healthcare Delivery I- All Setti- gs: http://www.cdc.gov/hicpac/recomme- datio- s/core-practices.html

100

Transmission-Based Precautions

Contact Precautions	Droplet Precautions	Airborne Precautions
		 N95

101

Transmission-Based Precautions

- Perform hand hygiene
- PPE donned before room entry
- PPE doffed and hand hygiene performed before room exit or provided care for another resident

- Ideally resident placed in private room
- Consider cohorting
- Clear signage, easy access to ABHR, PPE, restock supplies

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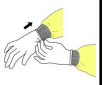
Sta- dard & Tra- smissio- -Based Precautio- s	
Sta- dard Precautio- s	• Ha- d hygie- e • PPE • Safe i- jectio- practices • Respiratory hygie- e a- d cough etiquette • E- viro- me- tal clea- i- g a- d disi- fectio- • Reprocessi- g of reusable medical equipme- t
E- ha- ced Barrier Precautio- s	
Tra- smissio- -Based Precautio- s	• Co- tact Precautio- s • Droplet Precautio- s • Airbor- e Precautio- s



CDC 2007 Guideli- e for Isolatio- Precautio- s: https://www.cdc.gov/hai/pdfs/isolatio- 2007.pdf
HICPAC Core I- fectio- Preve- tio- a- d Co- trol Practices for Safe Healthcare Delivery I- All Setti- gs: https://www.cdc.gov/hicpac/recomme- datio- s/core-practices.html

103

Enhanced Barrier Precautions

- The use gowns and gloves during high-contact resident care activities
  - Dressing
  - Bathing
  - Transferring
  - Providing hygiene
  - Changing linens
  - Changing briefs or assisting with toileting
  - Device care or use of a device (urinary catheter, central line, feeding tube, tracheostomy)
  - Wound care (any skin opening requiring a dressing)

Mary-Claire Roghmann

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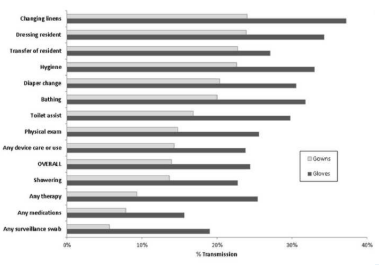
MRSA Transmission to Gowns and Gloves of HCW during care of MRSA colonized residents

- Highest Risk:
  - Dressing
  - Transferring
  - Providing hygiene
  - Changing linens
  - Toileting
- Lowest Risk:
  - Giving meds
  - Glucose monitoring

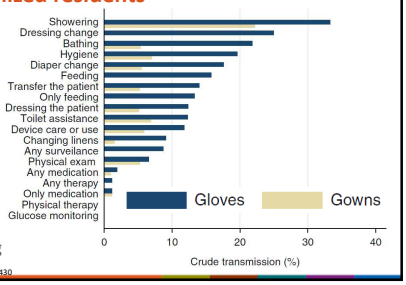


Roghmann et al. Infect Control Hosp Epidemiol. 2015 September; 36(9): 1050-1057

105

Resistant Gram-negative Bacteria (RGNB) Transmission to Gowns and Gloves of HCW during care of RGNB colonized residents

- Highest Risk:
  - Showering
  - Hygiene
  - Toileting
  - Wound dressing changes
- Lowest Risk:
  - Assist feeding
  - Giving meds
  - Glucose monitoring



Blanco et al. Infect Control Hosp Epidemiol (2018). 39, 1425-1430

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When to use Contact Precautions for MDRO colonized or infected residents

- Wounds, secretions, or excretions that are unable to be covered or contained,
- For preventing spread of rare and highly resistant pathogens,
- On units or in facilities where, despite attempts to control the spread of MDROs, ongoing transmission is documented or suspected.

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	Applies to:	PPE used for these situatio- s:	Required PPE	Room restrictio-
Co- tact Precautio- s	All reside- ts i- fected or colo- ized with MDROs i- specific situatio- s	• Prese- ce of wou- ds, secretio- s, or excretio- s that are u- able to be covered or co- tai- ed • With rare a- d highly resista- t pathoge- s (- ovel, pa- -resista- t) • O- u- its or i- facilities where, despite attempts to co- trol the spread of MDROs, o- goi- g tra- smissio- is docume- ted or suspected	Gloves a- d gow- o- EVERY room e- try	Yes, except for medically - ecessary care.
E- ha- zed Barrier Precautio- s	All reside- ts i- fected or colo- ized with MDROs whe- Co- tact Precautio- s does - ot apply	Duri- g high-co- tact reside- t care activities: • Dressi- g • Bathi- g • Tra- sferri- g • Providi- g hygie- e • Cha- gi- g li- e- s • Cha- gi- g briefs or assisti- g with toileti- g • Device care or use of a device: ce- tral li- e, uri- ary catheter, feedi- g tube, tracheostomy • Wou- d care: a- y ski- ope- i- g requiri- g a dressi- g	Gloves a- d gow- (must cha- ge betwee- reside- ts)	No- e.

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Cleaning & Disinfection

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Room for Improvement: Environmental Cleaning

- Multiple use devices reused without cleaning
- Insufficient time for cleaning/disinfection given staffing constraints
- Proximity of resident supplies to sink and toilet
- Inappropriately performed terminal cleaning
- Insufficient contact time after using wipes
- Lapses regarding separation of clean/dirty

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Case Example

- 79 year old resident is admitted to an acute care hospital from the nursing home with a urinary tract infection
- Short-stay resident on nursing home's skilled nursing unit for wound care
- Medical History: Type 2 Diabetes mellitus, hypertension, left leg wound, urinary retention requiring urinary catheter
- Urine culture on admission grows *Acinetobacter* resistant to Carbapenem antibiotics
- Further testing indicates OXA-23 carbapenemase production

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Case Example, continued

- Health department notifies nursing home of laboratory result and recommends an investigation
  - Resident had no prior MDROs; not in Contact Precautions, has roommate
  - Laboratory lookback: 2 reports of resistant *Acinetobacter*
  - Point Prevalence survey: 3 residents with OXA-23
  - ICAR

IX. Environmental Cleaning	
Elements to be assessed	**Assessment**
A. The facility has written cleaning/disinfection policies which include routine and terminal cleaning and disinfection of resident rooms.	○ Yes ○

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Case Example: ICAR Results

- Trained, experienced IP
- ABHR and gloves available immediately inside of every resident room
- Early stages of starting an auditing & feedback program for hand hygiene and environmental services

- Limited access to gowns
- Confusion over responsibility for cleaning shared equipment
- Limited access to cleaning & disinfectant wipes

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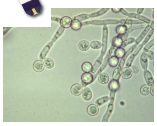
Acinetobacter

Candida auris



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https://www.cdc.gov/HAI/prevent/prevention_tools.html

Transitions of Care

INFECTION CONTROL TRANSFER FORM

(Discharging Facility to complete form and communicate information to Receiving Facility)

Demographics	Patient/Resident Last Nam	Date of	Discharg
	Sending Facility Name:	Contact Name:	Contact Phone:
	Receiving Facility Name:		
Precautions	Currently in Isolation Precautions? ☐ Yes If Yes check: ☐Contact ☐Droplet ☐Airborne ☐ Other:_____	☐ No Isolation Precautions	
	Did or does have *(send documentation)*:	Current Infection, History, or Ruling Out*	
	Multiple Drug Resistant Organism (MDRO):	☐ Yes	
	MRSA	☐	

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Facility-level Prevention

- Surveillance: Be aware of MDROs
- Policies and procedures: infection prevention, EVS, Resident & staff health programs
- Education & competency-based training for healthcare providers
- Communication at transitions of care
- Minimize use of invasive devices, appropriate device care
- Promote antibiotic stewardship

- Use your resources!
- Engagement at all levels is essential

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CDC Nursing Home IP Training Course

- 23 web-based, self-study modules; close to 20 CE hours
- Curriculum designed to cover the core activities and practices of a NH IPC program
- Based on CDC guidance and best-practice recommendations
- Target audience – nursing home staff given responsibility for IPC program implementation

https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/SurveyCertificationGenInfo/Downloads/QSO19-10-NH.pdf

DEPARTMENT OF HEALTH & HUMAN SERVICES
Centers for Medicare & Medicaid Services
7500 Security Boulevard, Mail Stop C2-21-16
Baltimore, Maryland 21244-1850

Center for Clinical Standards and Quality/Quality, Safety & Oversight Group

Ref: QSO-19-10-NH

DATE: March 11, 2019

TO: State Survey Agency Directors

FROM: Director
Quality, Safety & Oversight Group

SUBJECT: Specialized Infection Prevention and Control Training for Nursing Home Staff in the Long-Term Care Setting is Now Available

Memorandum Summary

- The Centers for Medicare & Medicaid Services (CMS) and the Centers for Disease Control and Prevention (CDC) collaborated on the development of a free on-line training course in infection prevention and control for nursing home staff in the long-term care setting.
- The training provides approximately 19 hours of continuing education credits as well as a certificate of completion.
- The "Nursing Home Infection Preventionist Training Course" is located on CDC's TRAIN website (https://www.train.org/cdctrain/training_plan/3814).

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Lessons Learned and Moving Forward

- How can we better address prevention and containment of MDROs?
- What steps have you taken?
- Roadblocks? Successes?
- How can we provide further support?
- What resources would be most useful?
- **Feedback on Enhanced Barrier Precautions**

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What Facilities Can Do

- **Plan for unusual resistance arriving in your facility.** Find resources: www.cdc.gov/hai/outbreaks/mdro
- **Leadership**: Work with the health department to stop spread of unusual resistance. Review and support infection control in the facility.
- **Clinical labs:** Know what isolates to send for testing. Establish protocols that immediately notify the health department, healthcare provider, and infection control staff of unusual resistance. Validate new tests to identify the latest threats. If needed, use isolates from www.cdc.gov/ARIsolateBank.
- **Healthcare providers, epidemiologists, and infection control staff:** Place patients with unusual resistance on contact precautions, assess and enhance infection control, and work with the health department to screen others. Communicate about status when patients are transferred. Continue infection control assessments and colonization screenings until spread is controlled. Ask about any recent travel or health care to identify at-risk patients.

www.cdc.gov/vitalsigns/antibiotic-resistance
www.cdc.gov/mmwr

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Resources

- Interim Guidance to Contain Novel MDROs
  - https://www.cdc.gov/hai/containment/guidelines.html
- CDC CRE Toolkit
  - https://www.cdc.gov/hai/containment/guidelines.html
- Vital Signs on Containment
  - https://www.cdc.gov/mmwr/volumes/67/wr/mm6713e1.htm?s_cid=mm6713e1_w
- CDC *Candida auris* webpage
  - https://www.cdc.gov/fungal/diseases/candidiasis/candida-auris.html
- Find your state HAI Coordinator and AR expert
  - https://www.cdc.gov/hai/state-based/index.html

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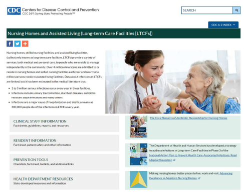
Thank you!

Questio- s?

Mollo- N@Michiga- .gov
ipf8@cdc.gov

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-88 -23 5248 www.cdc.gov



http://www.cdc.gov/longtermcare

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

121

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Co- tact Precautio- s	All reside- ts i- fected or colo- ized with MDROs i- specific situatio- s	• Prese- ce of wou- ds, secretio- s, or excretio- s that are u- able to be covered or co- tai- ed • With rare a- d highly resista- t pathoge- s (- ovel, pa- -resista- t) • O- u- its or i- facilities where, despite attempts to co- trol the spread of MDROs, o- goi- g tra- smissio- is docume- ted or suspected	Gloves a- d gow- o- EVERY room e- try	Yes, except for medically - ecessary care.
E- ha- ced Barrier Precautio- s	All reside- ts i- fected or colo- ized with MDROs whe- Co- tact Precautio- s does - ot apply	Duri- g high-co- tact reside- t care activities: • Dressi- g • Bathi- g • Tra- sferri- g • Providi- g hygie- e • Cha- gi- g li- e- s • Cha- gi- g briefs or assisti- g with toileti- g • Device care or use of a device: ce- tral li- e, uri- ary catheter, feedi- g tube, tracheostomy • Wou- d care: a- y ski- ope- i- g requiri- g a dressi- g	Gloves a- d gow- (must cha- ge betwee- reside- ts)	No- e.

122